the x-axis and wt % magnesium on the y-axis, said closed area being bounded by generally straight lines joining the following points:

POINT 1 = [0] 3 Cu[.], 0.6 Mg
POINT 2 = 4.5 Cu, 0.6 Mg
POINT 3 = [4.5] 3.7 Cu, [6.0] 2 Mg
POINT 4 = [0] 3 Cu, [6.0] 2 Mg
and back to POINT 1.

Please cancel Claims 13-15 and 23-25.

## REMARKS

Upon entry of this Amendment, Claims 1-8, 12 and 16-22 will be pending in the application. In response to the Examiner's restriction requirement, non-elected Claims 9-11 and 23-25 have been cancelled without prejudice.

By the present Amendment, Claim 1 has been amended to recite an aluminum alloy comprising from about 3 to about 4.5 weight percent copper, from about 0.6 to about 2 weight percent magnesium and from about 0.01 to about 0.99 weight percent lithium, wherein the copper, magnesium and lithium are present in the aluminum alloy in the form of a solid solution. Basis for the amended claim language is provided in the specification, for example, at page 5, line 26 to page 6, line 16, page 7, lines 1-22, and Fig. 1A.

Claim 12 has been amended to more clearly define the compositional boundaries of Cu and Mg in the recited aluminum alloy. Basis for the recited Cu and Mg levels is provided in the specification, for example, at page 7, line 23 to page 9, line 4, and Fig. 1A.

Claims 1-6, 8, 12-20 and 22 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Oezbilen. The Oezbilen abstract discloses an aluminum alloy including 2.07 percent Cu, 0.97 percent Mg and 0.87 percent Li. In contrast, independent Claims 1 and 12, as amended, recite a minimum of about 3 weight percent Cu. It is therefore submitted that Claims 1 and 12, and the claims that depend therefrom, are not anticipated by, or rendered obvious over, the Oezbilen abstract.

Claims 1-8 and 12-22 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over any of the following references: Pickens et al. U.S. 5,122,339; Pickens et al. U.S. 5,211,910; Pickens et al. U.S. 5,259,897; Uno et al. JP 01025954; Tack et al. WO

9532074; Witters et al. WO 9212269; Sperry et al. DE 2810932; Langen et al. U.S. 5,462,712; Rioja et al. U.S. 5,137,686; Rioja et al U.S. 4,869,870; Rioja et al. U.S. 4,832,910; Sawtell et al. U.S. 4,648,916; Cho U.S. 4,806,174; Young et al. U.S. 4,790,884; and Rioja U.S. 5,076,859. According to the Examiner, the cited references disclose alloy compositions which overlap the claimed alloy compositions. The following table lists compositional ranges disclosed by each of the cited references.

| Reference | Element range (wt %) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Li | Cu | Mg | Ag | Zn | Zr | Mn |
| Oezbilan - Abstract | 0.87 | 2.07 | 0.97 | --- | --- | --- | --- |
| Pickens et al. 5,122,339 | 0.1-4 | 3.5-7 | 0.05-1.5 | 0.01-2 | --- | --- | --- |
| Pickens et al. 5,211,910 | 0.1-4 | 1-7 | 0.05-3 | 0.01-2 | 0.5-4 | --- | --- |
| Uno et al. - JP 01025954 | 0.5-4 | 0.5-5 | 0.5-6 | --- | --- | --- | --- |
| Tack et al. WO 9532074 | 0.4-2 | 3.5-5.5 | 0.01-1.5 | 0.01-0.8 | --- | 0-1.0 | --- |
| Witters et al. WO 9212269 | 0.2-5 | 0-6.5 | 0-5 | 0-2 | 0.05-12 | 0-1.0 | 0-2.0 |
| Sperry et al. DE 2810932 | 0.4-0.8 | 0-10.2 | 2-4 | --- | 0-0.3 | 0-0.15 | 0.1-0.7 |
| Langen et al. 5,462,712 | 0.5-1.8 | 3.5-7 | 0.05-3 | --- | 0.5-4 | --- | --- |
| Kramer et al. 5,512,241 | 0.4-1.8 | 3-7 | <0.01 | >0.1 | --- | --- | --- |
| Baumann et al. 5,624,632 | --- | --- | 3-7 | --- | --- | 0.05-2 | 0.2-1.2 |
| Rioja et al. 5,137,686 | 0.2-5 | >2.45 | 0.05-2 | --- | 0.05-2 | --- | --- |
| Rioja et al. 4,869,870 | 0.2-5 | 0.2-5 | 0.05-6 | --- | 0.05-2 | 0-1 | 0-2 |
| Rioja et al. 4,832,910, claims | 0.5-5 | --- 0-5 | --- 0-5 | --- | --- 0-7 | --- 0-1 | --- 0-2 |
| Sawtell et al. - 4,648,916 | 0.5-4 | 0-5 | 0-5 | --- | 0-7 | 0-1 | 0-2 |
| Cho et al. 4,806,174 | 0.5-4 | 0-5 | 0-5 | --- | 0-7 | --- | 0-2 |
| Young et al. - 4,790,884 | 0.5-4 | 0.1-5 | 0.1-5 | --- | --- | 0.1-1 | --- |

not on record

Amended Claim 1 recites specific ranges of Cu, Mg and Li which are present in the aluminum alloy in the form of a solid solution. As discussed beginning at page 5, line 26 of the specification, the amounts of Cu, Mg and Li are controlled such that each element does not exceed its maximum solubility in the alloy, thereby maximizing the fracture toughness and damage tolerance of the alloy. In accordance with the claimed invention, the interaction of Li in solid solution with the atoms of Mg and/or Cu appear to give rise to the formation of clusters of atoms of solute. This behavior, which was not expected and is surprising, is apparently responsible for the improved fatigue performance of the alloys of the invention. As discussed at page 7, lines 1-22, by controlling the amounts of Cu, Mg and Li such that the atoms of these metals are amounts to be soluble in the alloy, the atoms of the alloying elements in solid solution form clusters which translate to increased fatigue crack growth resistance. The improved fatigue crack growth resistance achieved by the presently claimed alloys is described in the specification at page 11, line 33 to page 12, line 29, and demonstrated in Figs. 3-7.

Although the cited references disclose many different broad ranges of alloying additions which can be included in aluminum alloys, Applicants have found no teaching or suggestion of controlling the amounts of Cu, Mg and Li within the specific ranges recited in Claim 1, and further ensuring that each element does not exceed its maximum solubility in the alloy, in order to produce an alloy which exhibits increased fatigue crack growth resistance. It is therefore submitted that the aluminum alloy recited in Claim 1 provides unexpectedly improved results in comparison with known alloy compositions and is patentable over the prior art of record.

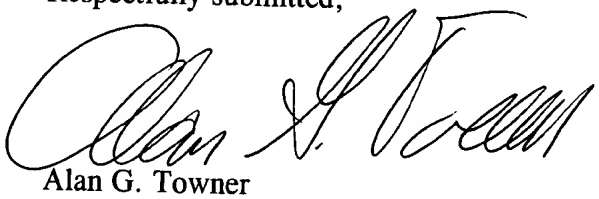
Amended Claim 12 similarly recites specific boundaries of Cu, Mg and Li alloying additions which have been found to provide improved mechanical properties. As recited in Claim 12, the amount of Cu ranges from about 3 to 4.5 weight percent, the amount of Mg ranges from about 0.6 to 2 weight percent, and the amount of Li ranges from about 0.01 to 99 weight percent. Furthermore, the combined amount of Cu and Mg must be below the line running from Point B to Point G in Fig. 1A. By controlling the amounts of Cu, Mg and Li within narrowly defined boundaries, and by further controlling the combined amounts of Cu and Mg as recited in Claim 12, Applicants have produced an aluminum alloy with

unexpectedly improved fatigue crack growth resistance properties. It is therefore submitted that the aluminum alloy recited in Claim 12 provides unexpectedly improved results in comparison with known alloy compositions and is patentable over the prior art of record.

In view of the foregoing amendments and remarks, it is submitted that Claims 1-8, 12, 16-22 are patentable over the prior art of record. Accordingly, an early notice of allowance of this application is respectfully requested.

In the event that any outstanding matters remain in connection with this application, the Examiner is invited to telephone the undersigned at (412) 566-6109 to discuss such matters.

Respectfully submitted,



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